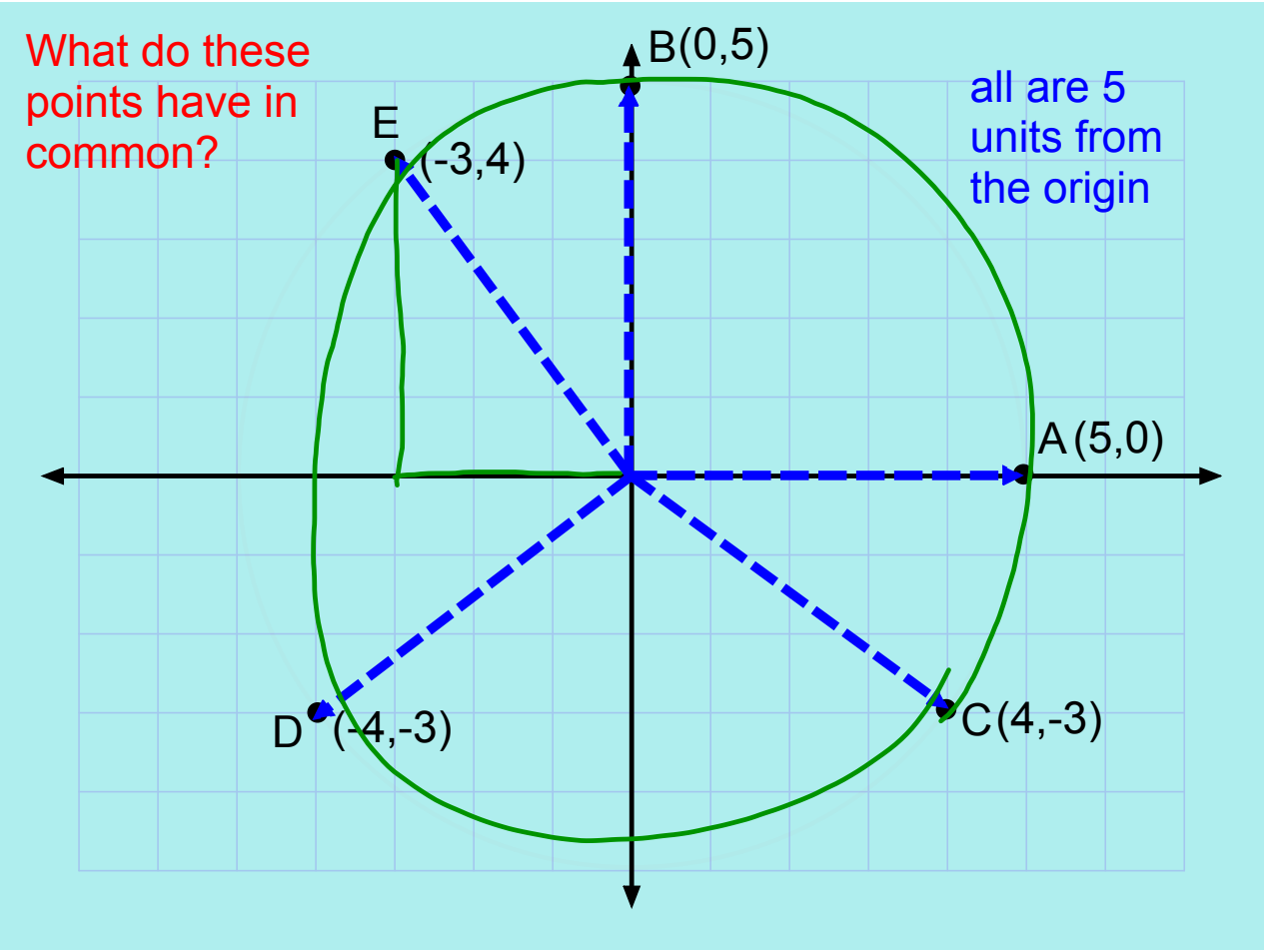


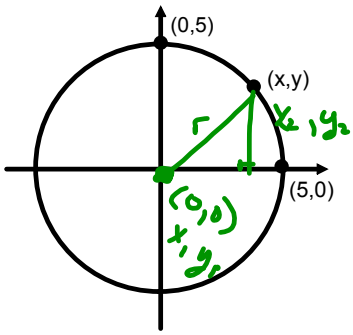
L4(2.3)-The Equation of a Circle in Standard Position (0,0)

Circle: The set of all points that are equal distance from a reference point (the centre).

Standard Position: The centre of the circle is at the origin (0, 0).

We can use this definition, along with the distance formula, to determine the equation of a circle.

Circle with centre (0,0)



Let P(x,y) be any point on the circle.

Then, OP = r

The formula for the length, d of a line segment is:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Substitute r for d, (x,y) for (x_2,y_2), and (0,0) for (x_1, y_1)

$$r = \sqrt{(x_2 - 0)^2 + (y_2 - 0)^2}$$

$$r = \sqrt{(x_2)^2 + (y_2)^2}$$

$$r = \sqrt{x^2 + y^2}$$

So the equation of a circle having centre (0,0) and radius r is

$$r^2 = x^2 + y^2$$

In general, a circle has a radius, r, and the equation of a circle in standard position is:

$$x^2 + y^2 = r^2$$

Ex.1. Write the equation of a circle in standard position with:

a) r = 2

$$x^2 + y^2 = 2^2$$

$$x^2 + y^2 = 4$$

b) $r = 3\frac{1}{5}$

$$x^2 + y^2 = \left(3\tfrac{1}{5}\right)^2$$

$$x^2 + y^2 = \left(\tfrac{16}{5}\right)^2$$

$$x^2 + y^2 = \tfrac{256}{25}$$

Ex.2 What is the radius of each circle?

(a) $x^2 + y^2 = 49$

$\sqrt{r^2} = \sqrt{49}$

$r = \pm 7$

Reject -7 because distance can not be negative

$r = 7$

(b) $x^2 + y^2 = 37$

$\sqrt{r^2} = \sqrt{37}$

$r = \sqrt{37}$ exact

$r \doteq 6.1$ approx

Ex 3. Write the equation of the circle with centre (0,0) and radius 4.

Assigned Work: p.91-92 # 1, 2, 3a, 4, 5, 6, 8

$x^2 + y^2 = 4^2$

$x^2 + y^2 = 16$